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Photothermal Deflection and Photoluminescence Studies of CdS and CdSe Quantum Dots

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Abstract

We report on the observation of the quantum confinement effect by using photothermal deflection spectroscopy (PDS) experiment and the time dependence of optically induced degradation in CdS and CdSe semiconductor−doped glasses. The observed absorption peaks in the PDS experiment, together with a simple model, were used to evaluate the average radius of semiconductor microcrystals. It is found that the estimated average radii of quantum dots are consistent with that obtained from other methods. This result demonstrates that the PDS technique provides an alternative tool for the study of the optical properties of semiconductor microscrystals. The time dependence of the luminescence degradation of the impurity band, which is attributed to the process of Auger ionization, follows a stretched−exponential function. The inconsistency with the previously proposed exponential relaxation may be due to the size distribution of CdS and CdSe microcrystals.